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SCIENCE NEWS-LETTER

The Weekly Summary of Current Science

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CANNON-BALL TREE

Odd Growth From South American Forests

(See page 303)

Vol. XVII No. 474

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Ocean Contains Three Kinds of Water

Geophysics

Shotgun and Watch Serve as Sounding Device

THERE are three different kinds of water in the ocean, scientists of the Carnegie Institution of Washington, one of whom belonged to the staff of the ill-fated non-magnetic ship, Carnegie, reported to the American Geophysical Union.

Results of some of the deep sea determinations of the Carnegie, which was destroyed with the loss of Captain Ault and the cabin boy in Western Samoa last November, were commented on by H. W. Graham, biologist and chemist, in a paper presented by Dr. J. A. Fleming, as follows:

"These samples show that the waters may be divided into three general layers. An upper layer where an active plant and animal life is maintained, a middle layer in which a decomposition of organic remains is taking place, and a lower layer which represents water which has been conducted from polar regions. The upper layer shows high values of dissolved oxygen but low values of phosphates, silicates and hydrogen in concentration. The middle layer is low in oxygen but is high in phosphates and silicates and is relatively less alkaline. The lower layer tends toward conditions at the surface with again higher values of dissolved oxygen and lower of phosphates, silicates and hydrogen ion concentration."

How a shotgun and stop-watch were used to determine the distance to the bottom of the ocean when the sonic depth finding apparatus broke was told by Floyd M. Soule of the ship's staff of scientists, and C. C. Ennis. The depth finding apparatus, which was borrowed from the U. S. Navy, is an electrical device for accurately measuring the time it takes a sound to travel to the bottom of the ocean and return. Knowing the speed of sound in water, the scientists could then quickly calculate the depth of the ocean.

"A steel breech just long enough to hold a 16-gauge shotgun shell was screwed into one end of a length of brass pipe," the paper said. "The pipe acted as a holder and also as a guide for a heavy steel firing pin which was dropped into the upper end of the pipe, the shell end being held a foot or two below the surface. The hydrophones were used to pick up the echo and a stop-watch used to measure the elapsed time. Soundings were taken in this manner twice a day. These were only roughly approximate because of the inaccuracy of the stop-watch measurement and because of the uncertainty of the velocity of a sound set up by an explosion. However, it was a case of half a loaf being better than none, and the device materially assisted in the routine occupation of oceanographic stations."

Sound sent to the ocean's floor behaved strangely and in ways unaccountable by the scientists. Sometimes the reflection would be loud from depths and weak from shallows. Again loud echoes and faint echoes would come from places where all known conditions were similar and even where bottom samples were much alike. The echoes from five-mile soundings were stronger than those often heard from less than one mile.

In water sound travels nearly a mile every second, more than four times as fast as it does in air. On several occasions signals were picked up after traveling 25 miles back and forth between the bottom of the ocean and the surface, and once they had gone nearly 50 miles, having been reflected 15 times when last heard.

NON-MAGNETIC ships such as the Carnegie may no longer be needed to continue studies of the earth's magnetism.

Knowledge of terrestrial magnetism has been so increased by world cruises of the Carnegie and her predecessor, the Galilee, and navigators have learned so much about compensating for the magnetic effect of ordinary steel ships that the work can probably be continued on a vessel not especially constructed to eliminate magnetic effect. This is the thought of a paper presented by W. J. Peters, of the Carnegie Institution of Washington. Trials to substantiate this conclusion were suggested.

Knowledge of the secular variations of the compass is needed now to keep the magnetic charts up to date, it was pointed out. These are age-long changes in the earth's magnetism which are felt in practically all parts of the world. For example, in London the variation changed steadily from 11 degrees east in 1580 to zero degrees in 1659. In 1823 it was 24 degrees west and has now declined to about 14 degrees west.

If non-magnetic ships can be used, scientists will be able to follow these variations closely by taking occasional observations from ships of other expeditions without having to outfit vessels especially for magnetic cruises.

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The Answer Is

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New Picture of Universe Painted

General Science

National Academy Awards Honors at Annual Meeting

A NEW picture of the universe, more modern than those painted by de Sitter and Einstein, was exhibited in the form of mathematical symbols in a report to the National Academy of Sciences by Dr. Richard C. Tolman of the California Institute of Technology, Pasadena.

Dr. Tolman bases his new explanation of the universe on today's idea of the way matter and radiation are distributed in space and time. This leads to an explanation of the mysterious shift of light toward the red that is observed by astronomers in the light from distant nebulae. These great light patches of the sky are now thought to be other universes of stars at great distances from our own Milky Way galaxy in which the sun is a minor star. One such nebula is rushing away from the earth at the rate of 7,200 miles per second if, as some scientists have previously thought, the red shift of the light is due to appalling differences of speed.

Although built on the theory of relativity, Dr. Tolman's idea of the universe differs from that of Einstein in such a way as to conform to the contemporary opinion of astrophysicists that the universe is actually filled with matter changing into radiation. Einstein assumed a static universe permanently filled with a constant distribution of matter. De Sitter's universe was permanently empty. Dr. Tolman's universe is non-static and in it matter is dissipating on the average as astronomers find that it must dissipate in order to account for the luminosity of early type stars that are more vigorously radiating than our sun.

If Dr. Tolman's conception of the way the universe is put together and operating receives further support from later theory and observations, he will have explained a modern scientific puzzle, the reddening of light from the far reaches of the universe. His conceptions also promise to reopen the question of whether the universe is running down or whether the conversion of matter into radiation progressing in the stars is compensated by a rebirth of matter elsewhere in the universe.

RECOGNITION for notable scientific accomplishment was accorded by the National Academy of Sciences at its closing session, through the award of medals to five prominent American and foreign scientists, and the election of fifteen men to membership.

One of the medal awards, the Public Welfare Medal, was given posthumously to the late Stephen T. Mather, organizer of the U. S. National Park Service and its director through the first years of its work. Since Mr. Mather died a short time ago, the Home Secretary of the Academy, Dr. David White of the U. S. Geological Survey, was instructed to present the medal to his legal representatives.

Ernest Thompson Seton, noted naturalist, received the Daniel Giraud Elliot medal and honorarium, which is given for the most meritorious work in zoology or paleontology published each year. Dr. Seton's book, "Lives of Game Animals," was selected as worthy of the prize for 1928. The award of the same medal for 1927 was given to Dr. Erik A: Son Stensio of the Royal State Museum of Natural History of Stockholm, for his work: "The Downtonian and Devonian Vertebrates of Spitzbergen. Part I: Family Cephalaspidae".

The Agassiz Medal for Oceanography was given to Dr. Johannes Schmidt, director of the physiological department of the Carlsberg Laboratory at Copenhagen. Dr. Schmidt some years ago attracted wide attention in the scientific world by his painstaking and brilliant work in solving the age-old riddle of where eels go to breed.

The Mary Clark Thompson Medal, for the most important services to geology and paleontology, was awarded to Prof. William Berryman Scott for distinguished work in paleontological research.

Dr. R. A. Millikan of the California Institute of Technology was re-elected foreign secretary of the Academy for a term of four years. Dr. K. T. Compton of Princeton University was elected member of the governing council, to succeed Dr. George E. Hale, retired. Dr. J. McKeen Cattell, publisher of Science, was re-elected to succeed himself.

SECRET hiding places of "dud" airplane bombs which had buried themselves deep in the earth when dropped from thousands of feet above Langley Field, Va., have been located by telephone.

For years army aviators have been conducting bombing practice on an area, a part of which was recently picked for a seaplane towing channel, said Dr. Theodore Theodorsen, of the National Advisory Committee for Aeronautics. There are always a few bombs, called "duds," which for some unknown reason do not explode. These buried themselves several feet in the ground.

If jarred and scraped by steam shovels excavating for the channel, they would undoubtedly explode doing great damage. How to locate them was a problem. They had been buried so long that no visible traces of holes were left on the surface.

"The National Advisory Committee for Aeronautics made a careful investigation of the situation and requested information from all organizations which it was believed might be able to render assistance," Dr. Theodorsen explained. "None of the proposed methods proved to be satisfactory and all had to be abandoned."

Profiting by the failure of these suggestions, Dr. Theodorsen designed an apparatus consisting of a pair of headphones and three large coils of wire mounted on a cylindrical wooden frame. Power comes from a little high frequency generator in a nearby truck. When in use, the frame is carried by two men over the ground being tested while the operator stands off to the side with the phones on and "listens for the bombs."

The center coil, supplied with power from the generator, sends a uniform pattern of magnetic lines of force through the other two coils and into the ground as deep as the coil is wide. While this power coil is passing over undisturbed soil its lines of magnetism link the other two coils uniformly, which then exactly balance each other and cause no hum in the phones. But as soon as it passes over a bomb, whose steel distorts the magnetism, the imaginary lines are concentrated around the lower coil and the two coils become unbalanced and produce a distinct hum in the phones.

Huge Carvings Are Dug From Palace of Ancient Assyrian King

Archaeology

By Dr. Edward Chiera

IN the spring of 1929 the Oriental Institute of the University of Chicago started a campaign of excavation at Khorsabad, in Iraq. Khorsabad is the name of a small village about twelve miles from Mosul. Its mud-brick houses, with thatched, sloping roofs face a large flat space which serves as a city square, a gathering place for the flocks, and a playground for children. When the expedition first went there, this flat square was broken by three pools of stagnant water and by those inevitable refuse heaps which have been made known to us as the place of refuge of the biblical Job.

Its inhabitants, as poor and unkempt as Iraq peasants generally are, eke out a miserable living from their fields and flocks, hoping to be fortunate enough to escape malaria, which constantly threatens them. The great majority of the houses are built on the plain, close to the ditch that gives impure water to quench the thirst of man and beast. Some others are perched on top of a low hill which affords them some measure of protection against the ravaging mosquitoes. A touch of the picturesque is given in summer by the many storks that nest unmolested on the roofs of nearly all houses and by the brightly colored dresses of the women. All things considered, there is nothing really remarkable about Khorsabad.

And yet its name is famous in the annals of archaeology. The village stands close to the magnificent city and palace of Sargon of Assyria, a place partly excavated by the French toward the middle of last century and sharing with Niniveh the honor of giving to the world the first fruits of Assyrian discoveries.

As our knowledge progressed, we came into closer touch with Sargon himself, who had then been known to the world only through a casual reference in the book of Isaiah. We learned that he was the king who conquered Samaria, deported over twenty thousand Israelites from that city, and replaced them with foreign peoples who began to practice idolatry and thus became objects of hate to the orthodox Jews. Centuries later it took the moral courage of Jesus to propound the parable of the Good Samaritan and to have personal dealings with them.

But if the capture of Samaria might have seemed important to Sargon, it was only because it came at the very beginning of his reign (722 B. C.). In other respects it was just one of the many incidents in his very adventurous life, and he would have been very much surprised, had some one told him that the capture of that city would have given him a name—and a bad one at that—for ages to come.

Though he boasted of his great military achievements, still these were a matter of course for all the Assyrian kings. They had to fight either to increase or to defend their far-flung empire. Could we have asked Sargon himself, he would have told us that his name was certain to be remembered by future generations through the great city he had built and called after his own name—Dur-Sharrukin, "the walled city of Sargon"—and through the magnificent palace which adorned it. And he is certainly right when he tells us that no one of his predecessors had ever conceived or executed anything so great.

The city was a large square, the sides of which measured about a mile and one-half in length; it was surrounded by an immense wall, defended by towers placed at regular intervals. Eight magnificently decorated gates gave entrance to it. Anticipating modern city-planning, the streets in Dur-Sharrukin were straight as in American cities. Stealing a march on the Romans, Sargon had a wide road, paved with huge blocks of stone, to connect the city with the rest of his world. Still further anticipating agricultural experimental stations, he built a large park in which he planted all sorts of trees from far distant countries. This he also beautified with artificial lakes and with a building which he calls a "Hittite house," but which really resembles a Greek temple.

But the palace itself was the real wonder. The temple of Solomon could have stood comfortably in one of its courtyards, and its walls were embellished with about sixty thousand square feet of stone reliefs, without counting mural decorations in glazed tiles and in colors. For the building precious woods and stones were carried from great distances by boat, the famous cedars of Lebanon contributing their due share. It baffles our imagination to think of how many workmen had to be employed in making bricks, leveling ground, and cutting stone; and one wonders how the Assyrian king could have mustered the large number of artists that the stone reliefs alone must have required.

But Sargon would have been sadly disappointed had he known that all of his work had been done in vain. The palace was hardly finished when he died in battle. His son Sennacherib did not want to remain in a palace and city that spoke of his father's glory. He began to build other and bigger palaces for himself.

Plunderers began to strip the then new structures of everything worth removing; for lack of attention the roofs began to let the rain in, and in no time at all the walls, built of unbaked bricks, cracked and fell. It is reasonable to suppose that the inhabitants of the city proper did not leave their houses in such great haste. But they were mainly foreigners, brought by Sargon from all lands to populate his newly-made city, and they had no love for the place. Little by little they abandoned their new home, and the fate of the city followed that of the palace. For many centuries no one ever knew either the name or the site of Dur-Sharrukin.

In the middle of the nineteenth century some peasants pointed out to Botta, who was excavating at Niniveh, that sculptured stones resembling those he was finding there were to be found also near the village of Khorsabad. Botta, who must have been an alert and energetic man, followed the lead and started excavations in Khorsabad also. He was amply rewarded for his efforts; and the splendid finds at Khorsabad, together with those of Niniveh, announced to the world that the seat of a long lost civilization had been discovered.

But circumstances prevented completion of the excavation. The city itself was hardly touched; and of a second palace of the same king, situated a few hundred yards from the first, only two or three rooms were uncovered. Then the excavators left; and slowly even the traces of their work were effaced, and the peasants of Khorsabad resumed sowing their barley over the ruins of the ancient city.

In the spring of 1928, while in Iraq, I received the information that some antiquities had been uncovered by the natives on the ancient mound. A hasty survey brought out many interesting facts. A portion of the *tell* had been used by the villagers as a stone quarry. Numerous fragments of relief were lying about, more or less hidden by the barley which had been planted there. A little excavation brought out the fact that the "quarry" had been located over a corridor, which had originally been adorned with a double register of small reliefs. There was no time just then to do anything more than protect the place from further damage by having a large amount of dirt dumped upon it. It was learned also that the inhabitants of the near-by village of Fadhaliah had dug up two huge Assyrian bulls from one of the city gates and converted them into lime. The "mayor" of Khorsabad volunteered information that in the very courtyard of his house another Assyrian bull had been found. After serving as a plaything for the village children, who used to jump on its back, it had finally been taken out.

Right in front of his house was a large round grinding-stone made of a huge block of gypsum. It was at least half a meter thick and much too big to have come from a relief. No one knew where that huge block had come from, and the mystery was not solved until a year later, after excavations had been started. But there was no doubt at the time that some Assyrian bull had been taken from the gate which he had been steadily watching and was now turning round and round, pulled by a miserable donkey, and grinding barley. *Sic transit gloria mundi.*

Reliefs had been put to other useful work also. One huge slab of basalt formed a bridge over an irrigation ditch; a smaller one made a good step for a well; and the bearded head of one of Sargon's officials was used as a block for cutting wood. When the axe had failed to strike right and had hit on the poor head, it naturally left a deep mark on it. But the head was still in good enough condition to be saved for a museum, and it was quickly acquired.

Then the natives, in the hope of gaining some easy money, indicated a place where some other pieces had been hidden. From this "cache" came out three other heads, all chiseled away from their bodies, and also fragments which, when put together, made up the heads of two horses. We might say the head of *a* horse, since of the second one, behind the first, only its upper part was visible. The first piece found was the actual head, in natural size, cut away at the jawbone. But its workmanship was perfect. There was so much life in that small piece of sculpture that it was evidently the work of a master. The surrounding ground was combed very carefully and produced other fragments with the splendid head ornaments and part of the trappings. The upper right portion of the relief could be reconstructed in its entirety. Since the season was already advanced and the heat oppressive, the survey work had to be closed. Back in America a study was made of the work of the early French explorers, and the place from which those heads had been taken could be definitely ascertained. The bodies must still be in position, and probably in good condition, for the hill at that point was rather high and no stone was showing through. The Iraq Museum, in dividing the finds, had given the horses' heads to the Oriental Institute. Would it not be possible to complete the piece by excavating for the bodies? Professor James H. Breasted, the Director of the Oriental Institute, decided that it was worth while trying. The next spring I was sent back to Khorsabad, and regular excavations were started.

It would be impossible, in the brief compass of this article, to give even a rough description of the work done by the first campaign. Suffice it to say that its results surpassed our fondest expectations. The bodies of the horses were found, and in sufficiently good condition. They will soon be reunited with their (*Turn to page* 302)

An Awesome Assyrian Statue Moves At Last

A WARNING against intemperance in the use of the radio, which it was suggested would produce mental indigestion comparable to the physical indigestion resulting from intemperate consumption of food, was issued by Dr. R. Sommer, professor of psychiatry at the University of Giessen and chairman of the German Association for Mental Hygiene, at the First International Congress on Mental Hygiene.

"We must take a stand in regard to the modern invention of the radio, which allows the individual to expose himself to a great number of impressions," Dr. Sommer said. "To be sure there is much exaggeration here, just as in the case of overeating. But if these technical achievements are sensibly used, if people are temperate in listening to music and lectures, and do not, as often occurs, try to take in in a short time an international mixture from all sorts of cities, the radio can also be used in the problems of mental hygiene."

Dr. Sommer spoke on the meaning of recreation and avocation in mental hygiene. In a wide sense, suitable nourishment and sleep must be called recreation, since this term means a rebuilding of exhausted forces, both physical and mental.

Too much food is harmful, rather than beneficial, medical and physiological investigations have shown, and Dr. Sommer suggested that too heavy a program of other types of recreation might also be harmful.

Speaking of sports as means of recreation, he said their value must always be decided for the individual case, and that sports and exercise as recreation for women should be chosen carefully with due regard for the physical make-up of women.

"I have seen often that a well-regulated and intellectually interesting avocation saves people from premature petrification and, physically, from senility," Dr. Sommer remarked in discussing the advantages of avocations as a form of recreation.

"Of course, there are various kinds of preoccupation with one or more of the arts. For me, for example, it is a source of recreation to look at a picture or statue, considering all its details; for others, the same is perhaps true in the realm of music, or they may find it in reproducing great works by playing the piano.

"It is no mere chance that a whole list of famous physicians have become known through their avocations—music, literature, etc."

Radio Seen As Cause Of

Mental Hygienists to Modern

Heritage

THE laws of heredity, working relentlessly, keep alive from generation to generation some of the most serious mental diseases, Prof. E. Rudin, eminent German psychiatrist, declared.

Prof. Rudin, who has conducted genealogical studies at the German Research Institute for Psychiatry in Munich, reported that if one parent is afflicted with manic-depressive insanity, at least 33 per cent. of the children of the family will suffer from this malady, and in addition another 33 per cent. of the children will be mentally abnormal in some other fashion.

If one of the parents suffers from Huntington's chorea, which is a severe form of St. Vitus dance, then about 50 per cent. of the children will have the same hereditary disease, he has found. Among parents who have dementia praecox, about 50 per cent. of the children are mentally defective.

Voluntary sterilization of the hereditarily diseased or hereditarily defective was advocated by Prof. Rudin, as the most suitable measure to lessen the suffering caused by these diseases.

"Eugenics means an enormous saving of useless, or partially unsatisfactory mental hygiene," Prof. Rudin emphasized.

Prevention

"THERE would be just as much sense in sending the case of scarlet fever to a reformatory as in sending a delinquent schoolboy to jail."

So declared Dr. Haven Emerson, professor of public health administration at the College of Physicians and Surgeons in New York City, before the opening meeting of the First International Congress on Mental Hygiene.

Public health work can no longer be limited to the control of communicable disease, correction of physical defects in children or safeguarding the lives of mothers and children in childbirth. It must also include prevention of mental disease and correction of defects in nervous and emotional control, Dr. Emerson said.

"The health officer must begin to ask himself such questions as: Will the psychiatrist get to the mean, lazy ne'er-do-well before the policeman does? Will the bully, the fearful child, the miserable man meet a wise social worker before he is forced into an institution?" Dr. Emerson continued.

"Is it not at least as important that the suicide rate has risen from 4.9 to 19.7 per 100,000 of our people in seventy years as that the diabetes death rate has done about the same?" he asked. "Is there a greater need to report upon a rising death rate from appendicitis or to analyze, publish, teach, and if possible prevent the conditions that have brought about a rise in the divorce rate from 26 per 100,000 to 68 per 100,000 in less than fifty years?"

If the Traveller's Aid stations at our city railroad terminals can show the number of runaway children, unwholesome homes, misunderstood wayward children, the too-heavy hand of discipline, they are as important to public health as collecting depots for diphtheria smears and typhoid cultures at our drug stores and hospitals, Dr. Emerson suggested.

It is just as much the province of the doctor of public health to concern himself with occurrence of temper tantrums as with the prevalence of rickets in a community. Perhaps the probabilities of truancy can be estimated on the basis of today's records of boys who have motherless homes or breakfastless mornings.

Much improvement in the field of mental health may be hoped for through preventive measures, Dr. Emerson observed. Only about one-tenth of retarded school children owe their difficulties to such causes as heredity, mental disease or epilepsy, Dr. Emerson pointed this out as an encouraging fact when considering the possibilities of prevention.

"Betterment of social, emotional and material surroundings and in particular of the parental conduct of the child's life prior to school age may result in as great benefits as we have seen among babies from the almost universal use in our cities of safe water and pasteurized milk," he declared.

A Greater Problem

FOR every mentally ill patient so diseased that he is a menace to those about him, there are a hundred persons who are merely queer.

These masses of unhappy, socially

Of Serious Mental Indigestion

Consider World Menaces Sane Living

inefficient people are a greater problem than the comparatively few who commit murder or suicide or become legally "insane," Dr. Douglas A. Thom, of the Massachusetts Department of Mental Diseases, indicated in a discussion of his work to prevent children's personalities from becoming warped and twisted.

Dr. Thom showed that it is frequently the child's environment that is pathological, or abnormal, and not the child himself. Habit clinics for little children of pre-school years are working to set these children right with life so that they will grow up able to make a living and get on with other people effectively.

The clinic cannot do more than the parents will give it a chance to do, he said, for without the parents' cooperation the clinic doctor's guidance cannot be carried out.

Few of the children who are in danger of becoming anti-social individuals can be studied by psychiatrists at clinics. So, if mental hygiene is to be of practical value it must be reduced to such terms that its general principles can be applied by intelligent physicians, nurses, parents, and teachers, Dr. Thom said.

Childish

WHEN the machine age in which we live gets to be too much for men to endure, some of them take to tobacco, chewing gum or the movies, while others take to crime, said Dr. Franz Alexander, noted Berlin psychoanalyst.

Crime, in Dr. Alexander's opinion, is essentially childish, an attempt at gratifying instinctive desires for pleasure. An ecomonic motive may be present also, but Dr. Alexander, who follows the famous Viennese Professor Freud, believes that the instinctive, childish desire for pleasure is the fundamental factor in all crime. In some types of crime, as in kleptomania, it is obviously paramount. In other types of crime, which we are accustomed to think of as more normal, it is overlaid with the economic idea.

We should not ask why some men are criminals but why all men are not criminals, Dr. Alexander stated. He gave as his opinion that all children start out with these criminal tendencies, but as they grow up some of them are able to satisfy their craving for pleasure in non-criminal ways.

However, our present highly organized society forces men to grow up faster and further than they are able to, and neglects their childish demands. These are apt to find an outlet in criminal acts of one sort or another.

Fortunately, the same machine age that has taken away so much of man's chance to express his individuality and to gratify his pleasure-loving instincts has given him other outlets for them in movies, chewing gum, tobacco, and our great sport spectacles.

These latter are not unlike the great circuses which wise old Caesars provided for the Roman masses. We must take a lesson from the Caesars and find a scientific substitute for their circuses, Dr. Alexander advised.

"Caesar grasped the social significance of the circus and developed it systematically. He saw in it a great chance for relief from the inner pressure into which the members of an over-organized society are forced," Dr. Alexander stated.

The most important social problem of mental hygiene in the future is to find a more satisfactory outlet for man than any we now have, he said.

"Our highly organized civilization, which repeats in intensified form the problems of older civilizations, can replace the political insight of a Caesar only by measures that rest on conscious scientific views."

Specialists

WHETHER they know it or not, the modern father and mother are specialists in bringing up children, not because they do it so well but because their home activities are now limited to that one main task.

This sharp narrowing down of the functions of home life in America was brought to the attention of the International Congress on Mental Hygiene by Mrs. Sidonie M. Gruenberg, of Teachers College, Columbia University.

When a home was a workshop and a busy place of many activities, a housewife could maintain her status and perhaps also her self-respect if she proved to be rather an incompetent guide for her children, said Mrs. Gruenberg. Today, if she fails as a mother, she cannot fall back upon compensating virtues as cook or laundress.

It was once considered enough if the father was a good citizen and provider. In the home today, parents are coming more and more to be judged by their success in maintaining good relationships between the members of the family.

Deploring routine and artificial conditions of the American child's life at home and at school, Mrs. Gruenberg said that growing boys and girls are appallingly unaware of alternatives, almost totally innocent of experience in the making of choices. This fact that they are not allowed to make decisions for themselves explains why modern youth is accused of being immature and irresponsible, she stated.

The opportunity to earn should be part of every child's experience, Mrs. Gruenberg also urged.

Fathers and mothers should realize that their social strivings, their money strivings, their love strivings all too often impose on their children false standards and expectations, she said. The tensions that result from these home dramas are stumbing blocks to normal growth in the littlest children, but it is in adolescence that the unfortunate home conditions take their most visible toll.

Teach Psychiatry

MORE than three-fourths of the patients of the general practitioner during the first ten years of his practice need psychiatric treatment, declared Dr. Edward A. Strecker of Jefferson Medical College, Philadelphia.

To meet this condition successfully, the physician should be given more training in psychiatry during his days in the medical school, Dr. Strecker advised.

The large group of patients mentioned by Dr. Strecker as needing psychiatric treatment includes those suffering from chronic organic disease, such as kidney or heart trouble, those convalescing from serious illness, and children who suffer as much from behavior problems as from physical ails. Also there is a large group suffering from functional disorders of the nervous system.

Dr. Strecker urged that the medical student be taught how to treat the mental disturbances of these patients as well as their physical disorders.

Science News-Letter, May 10, 1930

Blowing

"I HAVEN'T heart trouble," gasped P. V. Wells as he finished blowing into a tube from a little wooden box on a table before members of the American Physical Society meeting.

"If I did I would have become exhausted and stopped blowing long before 50 seconds had passed," he explained.

The flarimeter, a new instrument which will enable people to tell whether they have heart trouble far in advance of serious developments, was being demonstrated. It is now in experimental use by insurance companies and promises greatly to reduce the risks taken by these organizations.

"Shortness of breath, the leading symptom of an impaired heart muscle, is measured," Mr. Wells explained.

The person being tested forces air out of his lungs at a slight, constant pressure, and those who suffer from shortness of breath become exhausted much sooner than normal persons.

Physiology-Physics
Science News-Letter, May 10, 1930

Caused Indian Wars

EARLY Indian wars which menaced the lives of the colonists were due at least in part to failure of the Colonials to understand how the Indians regarded ownership of land, Dr. M. W. Stirling, chief of the Bureau of American Ethnology of the Smithsonian Institution, believes.

"The Indians," he stated in explaining present-day researches among American Indians to the House Appropriations Committee, "never had any idea of individual ownership of land, or even of tribal ownership of land. They usually recognized boundaries within which a certain tribe had certain rights; but no individual in a tribe, no chief or anyone else, had the right to dispose of that property, according to their customs.

"When the whites came in to get hold of property they overlooked this fact. They made what purported to be documentary deals with head men of various Indian tribes, thereafter taking possession of the land. The Indians never recognized any change of ownership there, and naturally there was trouble."

Present day researches among the Indians, in an effort to reconstruct history and record changes taking place in Indian customs after contact with civilization, Dr. Stirling believes, will shed psychological light on many problems, and should enable legislators who deal with Indians today to dispose of problems more intelligently.

The Indians are almost pathetic in their eagerness to cooperate, Dr. Stirling stated, and it is touching to see how anxious they are to be understood, particularly some of the older Indians.

"When they discover that the ethnologist working with them actually has an intelligent and sympathetic knowledge of the beliefs that they have been so accustomed to seeing laughed at, or so totally misunderstood, they want to put in more time than the ethnologist can usually find at his disposal for this work," Dr. Stirling said.

Ethnology
Science News-Letter, May 10, 1930

Asteroid

THE discovery of a new minor planet, or asteroid, belonging to the famous Trojan group, is reported by the Astronomisches Recheninstitut at Berlin.

Unlike Planet X, recently located far beyond Neptune by Lowell Observatory, the new minor planet and most of the other more than a thousand asteroids have orbits that lie between those of Mars and Jupiter. They are only a few miles in diameter.

The new asteroid was found by K. Reinmuth, assistant at the Königstuhl Observatory, and its orbit was computed by Dr. G. Stracke of the Astronomisches Recheninstitut. It proved to be the seventh Trojan planet, another of a group of asteroids of great interest to astronomers because they keep always at approximately the same distance from Jupiter as well as from the sun. Moving at the same rate as Jupiter when viewed from the earth, they represent actual examples of the famous Lagrangian solution of how three bodies act upon each other in space.

The new planet, as yet unnamed, is found to be close to Achilles, Hector, Nestor and Agamemnon, which are preceding Jupiter in their travel around the sun, while Patroclus and Priamus follow the giant planet of the solar system.

Like the rest of the asteroids, the new one is thought by astronomers to be a fragment of a planet that once may have occupied the vacant space between Mars and Jupiter but which was spoiled in the making.

Astronomy
Science News-Letter, May 10, 1930

Flickerless Movies

ACCOUNTS of a new method of motion picture projection for which the inventor claims a complete absence of flicker, have just been received at the U. S. Department of Commerce from Assistant Trade Commissioner Du-Wayne G. Clark, stationed at Johannesburg, South Africa.

According to Mr. Clark, the salient feature of the new projector is a series of lenses arranged in a channel shaped like the letter "D". These move with the film, so that an image of each picture is formed through a separate lens. Two or three lenses are in use simultaneously, and cast their images on a large lens which, in turn, combines them on the screen. The result is that each picture fades imperceptibly into the next, without the alternations of light and darkness typical of the usual projector.

Some years ago C. Francis Jenkins, Washington inventor, developed a means of securing this same effect with a single lens and a special rotating prism. He also developed a camera using a number of lenses which moved with the film, as in the South African projector, but they were arranged around the edge of a disc. This method was used in a high speed camera which was run so rapidly that it was impossible to stop and start the film for each exposure as in ordinary cinematography.

Photography
Science News-Letter, May 10, 1930

IN VARIOUS CI

Health Insurance

THE development of national health insurance is increasing along three lines, Dr. George F. McCleary, medical officer of the British Ministry of Health, said at the last of this season's De Lamar lectures at the Johns Hopkins School of Hygiene and Public Health.

"The schemes in operation in the various countries differ considerably in regard to the proportion of the population coming within the scope of the scheme, the nature and extent of the benefits given and the relative costs falling on the insured persons, the employers and the State, but three broad lines of tendency may be observed," Dr. McCleary said.

"The number of occupations made insurable tends to increase; the benefits in kind are relatively more fully developed and extended than benefits in cash; and an increasing effort is expended in preventive work."

Health insurance on a national basis has had most important in-

fluence on the work of the medical profession in the various countries, Dr. McCleary said. Serious difficulties have been encountered which, however, are believed to be in process of adjustment.

Dr. McCleary outlined the development of mutual insurance against sickness, describing its place among the activities of the Guilds of the Middle Ages and the Friendly Societies in the 18th and 19th centuries. In 1884 sickness insurance on a compulsory basis was introduced into Germany by Bismarck and has since been adopted by most European countries, he said.

Economics

Science News-Letter, May 10, 1930

A Distressed Coyote

COYOTES are usually given credit for being cautious and cunning, but there is one bit of woodcraft which the tribe never seems to learn. They cannot get it through their heads that porcupines are not nice animals to play with. Ranger "Scotty" Bauman, of the National Park Service, is one of the most experienced coyote-killers of these parts, and he declares that 75 per cent. of all the coyotes taken in the park have porcupine quills in them.

"Scotty" recently sent in to park headquarters a report from a friend of his, Mr. Fisher, of the transportation company, of a distressed coyote he had seen. "More quills in his mouth than the average porcupine has on its body," was Mr. Fisher's summary of the animal's plight. He walked right up to the coyote, and could have killed it with a club had he desired, so engrossed was the poor creature in the task of trying to get rid of the troublesome spines.

Zoology

Science News-Letter, May 10, 1930

Immigrant Problem

REALLY intelligent immigration legislation can be based only on a careful scientific study of the races to be dealt with, using the technique of modern anthropology. This is one thesis advanced by Dr. Fay-Cooper Cole, professor of anthropology at the University of Chicago, and chairman of the division of psychology and anthropology of the National Research Council.

"The technique developed in our studies of simpler cultures are now being modified and applied to our alien groups," said Prof. Cole. "So long as we drew our population largely from northern Europe there was little difficulty in adjusting the newcomers to American conditions, but with the influx from southern Europe the situation changed. We were then forced to deal with people whose social, economic and mental backgrounds were very different from our own, and our attempts to incorporate them into our national life were far from successful.

"To remedy this situation Anthropology is carrying on intensive investigations of these people in their home-lands. It is studying the physical types and cultures of the peasants of Sicily, Mexico, and other regions from which we have drawn or are still drawing large numbers of immigrants, in order that we may be able to intelligently direct their adaptation to American life and conditions. The practical application of such studies is beyond question. If you wish to understand the Mexican in Chicago you must first know him in Mexico."

Sociology

Science News-Letter, May 10, 1930

Man's Antiquity

THE great antiquity of man, as man, claimed by Dr. Henry Fairfield Osborn, president of the American Museum of Natural History, is challenged by an equally eminent scientist, Dr. Ales Hrdlicka, anthropologist of the U. S. National Museum at Washington. Dr. Hrdlicka does not believe that human beings existed in Tertiary times, before the beginning of the great Ice Age, but that they appeared on the scene much later, some time during the Quarternary, when the glaciation of Europe and eastern America was in progress.

Dr. Hrdlicka is skeptical of a number of points on which Dr. Osborn and his fellow-supporters of Tertiary man are quite convinced. He doubts, for one thing, whether it is definitely proved that the remains assigned to Tertiary man, especially those at Piltdown, England, are really Tertiary in their geology. The dividing line between the two ages, he said, is always hard to determine, and many geologists and archaeologists hesitate to assign the Piltdown and other remains to a greater antiquity than they must.

The earliest authenticated finds of human bones and tools belong to the middle of the Quarternary, Dr. Hrdlicka said. They represent the culture called Chellean, and the one sure human bone is the famous Heidelberg jaw from Mauer, Germany. But between these and Tertiary time there is a gap of two glacial advances and a major interglacial stage, representing about a third of all Quarternary time.

Anthropology

Science News-Letter, May 10, 1930

Chromolinoscope

RIBBED photographic film, such as amateur movie makers use when they take movies in color, was suggested as a means of making still photographs in color by Dr. Herbert E. Ives, physicist of the Bell Telephone Laboratories.

Dr. Ives pointed out that this was really a revival of an instrument invented by his father, Frederic E. Ives, called the chromolinoscope, in which a separate screen of tiny ridges separated the light from a lens divided into three parts by three different color filters. This method was applied for amateur color movies by impressing the ridges on the film itself. Dr. Ives also suggested a means of copying such pictures in color, by photographing them with similar ridged film, but with the ridges running at right angles to those in the negative, thus avoiding troublesome "moire" effects.

Photography

Science News-Letter, May 10, 1930

Carsickness

CARSICKNESS, a kind of seasickness which some people suffer from while riding on street cars, does not result from the rider's looking out of the window, as has been popularly believed, Dr. James E. Lebensohn of Northwestern University reported to the American Physiological Society.

The illness is caused by the disturbance of the labyrinth of the ear due to the jarring of the car, Dr. Lebensohn stated. In his experiments subjects in the laboratory were able to follow a moving object which caused their eyes to move back and forth for hours without suffering any nausea. But when the up and down motions and slight jars of a moving car were reproduced in the laboratory, the carsickness resulted.

The same condition was produced when the labyrinth of the ear was stimulated by electricity, so that the fluid in the semicircular canals of the ear was continually disturbed, Dr. Lebensohn said.

Physiology

Science News-Letter, May 10, 1930

The System of the World — A Classic of Science

Astronomy

THE SYSTEM OF THE WORLD, by M. le Marquis de Laplace [published 1796], translated from the French, and elucidated with explanatory notes, by the Rev. Henry H. Harte. Dublin: MDCCCXXX (1830).

Laplace's hypothesis of the structure of the universe is one of the great summations in the history of science. It was published in two forms: in the universal language of mathematics as "Mechanique Celeste," and, for others than mathematicians to read, as "L'Exposition du Systeme du Monde." The relationship between our sun's solar system, our galaxy of stars which makes up the "milky way," and the various types of nebulae still affords one of the most fertile fields of research to astronomers, who are building larger and larger telescopes to get more data on our remotest neighboring universes.

THE preceding summary of the history of Astronomy presents three distinct periods, which referring to the phenomena, to the laws which govern them, and to the forces on which these laws depend, point out the career of this science during its progress, and which consequently ought to be pursued in the cultivation of other sciences. The first period embraces the observations made by Astronomers antecedently to Copernicus, on the appearances of the celestial motions, and the hypotheses which were devised to explain those appearances, and to subject them to computation. In the second period, Copernicus deduced from these apperances, the motions of the Earth on its axis and about the Sun, and Kepler discovered the laws of the planetary motions. Finally in the third period, Newton, assuming the existence of these laws, established the principle of universal gravitation; and subsequent Geometers, by applying analysis to this principle, have derived from it all the observed phenomena, and the various inequalities in the motion of the planets, the satellites, and the comets. Astronomy thus becomes the solution of a great problem of mechanics, the constant arbitraries of which are the elements of the heavenly motions. It has all the certainty which can result from the immense number and variety of phenomena, which it rigorously explains, and from the simplicity of the principle which serves to explain them. Far from being apprehensive that the discovery of a new star will falsify this principle, we may be antecedently certain that its motion will be conformable to it; indeed this is what we ourselves have experienced with respect to Uranus and the four telescopic stars recently discovered, and every new comet which appears, furnishes us with an additional proof.

Such is unquestionably the constitution of the solar system. The immense globe of the Sun, the focus of these motions, revolves upon its axis in twenty-five days and a half. Its surface is covered with an ocean of luminous matter. Beyond it the planets, with their satellites, move, in orbits nearly circular, and in planes little inclined to the ecliptic. Innumerable comets, after having approached the Sun, recede to distances, which evince that his empire extends beyond the known limits of the planetary system. This luminary not only acts by its attraction upon all these globes, and compels them to move around him, but imparts to them both light and heat; his benign influence gives birth to the animals and plants which cover the surface of the Earth, and analogy induces us to believe, that he produces similar effects on the planets for, it is not natural to suppose that matter, of which we see the fecundity develope itself in such various ways, should be sterile upon a planet so large as Jupiter, which, like the Earth, has its days, its nights, and its years, and on which observation discovers changes that indicate very active forces. Man, formed for the temperature which he enjoys upon the Earth, could not, according to all appearance, live upon the other planets; but ought there not to be a diversity of organization suited to the various temperatures of the globes of this universe? If the difference of elements and climates alone causes such variety in the productions of the Earth, how infinitely diversified must be the productions of the planets and their satellites? The most active imagination cannot form any just idea of them, but still their existence is, at least, extremely probable.

However arbitrary the elements of the system of the planets may be, there exists between them some very remarkable relations, which may throw light on their origin. Considering it with attention, we are astonished to see all the planets move round the Sun from west to east, and nearly in the same plane, all the satellites moving round their respective planets in the same direction, and nearly in the same plane with the planets. Lastly, the Sun, the planets, and those satellites in which a motion of rotation have been observed, turn on their own axes, in the same direction, and nearly in the same plane as their motion of projection.

The satellites exhibit in this respect a remarkable peculiarity. Their motion of rotation is exactly equal to their motion of revolution; so that they always present the same hemisphere to their primary. At least, this has been observed for the Moon, for the four satellites of Jupiter, and for the last satellite of Saturn, the only satellites whose rotation has been hitherto recognized

Phenomena so extraordinary, are not the effect of irregular causes. By subjecting their probability to computation, it is found that there is more than two thousand to one against the hypothesis that they are the effect of chance, which is a probability much greater than that on which most of the events of history, respecting which there does not exist a doubt, depends. We ought therefore to be assured with the same confidence, that a primitive cause has directed the planetary motions.

Another phenomenon of the solar system equally remarkable, is the small excentricity of the orbits of the planets and their satellites, while those of comets are very much extended. The orbits of this system present no intermediate shades between a great and small excentricity. We are here again compelled to acknowledge the effect of a regular cause; chance alone could not have given a form nearly circular to the orbits of all the planets. It is therefore necessary that the cause which determined the motions of these bodies, rendered them also nearly circular. This cause then must also have influenced the great excentricity of the orbits of comets, and their motion in every direction; for, con-

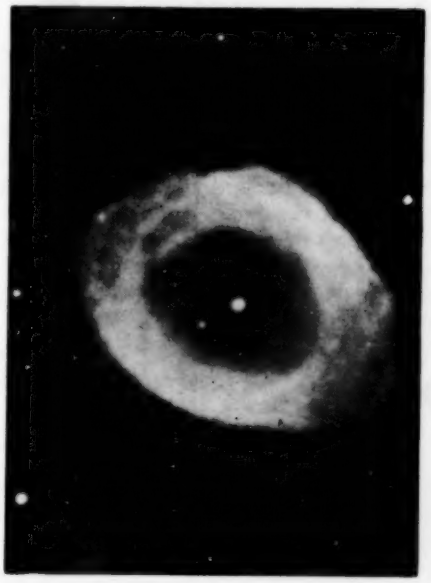
sidering the orbits of retrograde comets, as being inclined more than one hundred degrees to the ecliptic, we find that the mean inclination of the orbits of all the observed comets, approaches near to one hundred degrees, which would be the case if the bodies had been projected at random.

What is this primitive cause? In the concluding note of this work I will suggest an hypothesis which appears to me to result with a great degree of probability, from the preceding phenomena, which however I present with that diffidence, which ought always to attach to whatever is not the result of observation and computation.

Whatever be the true cause, it is certain that the elements of the planetary system are so arranged as to enjoy the greatest possible stability, unless it is deranged by the intervention of foreign causes. From the sole circumstance that the motions of the planets and satellites are performed in orbits nearly circular, in the same direction, and in planes which are inconsiderably inclined to each other, the system will always oscillate about a mean state, from which it will deviate but by very small quantities. The mean motions of rotation and of revolution of these different bodies are uniform, and their mean distances from the foci of the principal forces which actuate them are constant; all the secular inequalities are periodic.

The most considerable are those which affect the motions of the Moon, with respect to its perigee, to its nodes and the Sun; they amount to several circumferences, but after a great number of centuries they are reestablished. In this long interval all the parts of the lunar surface would be successively presented to the earth, if the attraction of the terrestrial spheroid, which causes the rotation of the Moon to participate in these great equalities, did not continually bring back the same hemisphere of this satellite to us, and thus render the other hemisphere for ever invisible. It is thus that the primitive attraction of the three first satellites of Jupiter originally established, and maintains the relation which is observed between their mean motions, and which consists in this, that the mean longitude of the first satellite minus three times that of the second, plus twice that of the third is equal to two right angles. In consequence of the celestial attractions the duration of the revolution of each planet is always very nearly the same. The change of inclination of its orbit to that of its equator being confined within narrow limits, only produces slight changes in the seasons. It seems that nature has arranged every thing in the heavens, to secure the continuation of the planetary system, by views similar to those which she appears to follow so admirably on the earth, for the preservation of individuals and the perpetuity of the species. It is principally to the attraction of the great bodies which are placed in the centre of the system of the planets, and the system of the satellites, that the stability of these systems is due, which the mutual action of all the bodies of the system, and extraneous attractions tend to derange. If the action of Jupiter ceased; his satellites, which now appear to move with such admirable

A planetary nebula. Laplace believed this type of object half way between a cloud of tenuous matter and a solar system like ours. The stuff making up the ring, according to his hypothesis, will condense into solid planets.



regularity, would be immediately disturbed, and each would describe about the Sun a very excentric ellipse; others would recede indefinitely in hyperbolic orbits. Thus an attentive inspection of the solar system evinces the necessity of some paramount central force, in order to maintain the entire system together, and secure the regularity of its motions. . . .

IT appears that far from being distributed at distances which are nearly equal, the stars are disposed in groups, some of which contain thousands of these objects. Our Sun, and the most brilliant stars, probably constitute part of one of those groups, which, seen from the earth, appear to surround the earth, and form the milky way. The great number of stars, which are seen in the field of a powerful telescope, directed towards this way, evinces its immense distance, which is a thousand times greater than the distance of Syrius from the earth, so that it is probable that rays emanating from these stars have employed several centuries to reach the earth. To a spectator at an immense distance from the milky way, it would present the appearance of an uninterrupted band of white light, having a very inconsiderable diameter, for the irradiation which subsists even in our best constructed telescopes, would not cover the interval between the stars. It is therefore probable, that amongst the nebulæ several consist of groups of a great number of stars, which, viewed from their interior, appear similar to the milky way. If now we reflect on the profusion of stars and nebulæ distributed through the heavenly regions, and on the immense intervals between them, the imagination, struck with astonishment at the magnitude of the universe, will find it difficult to assign any limits to it.

Herschel, while observing the nebulæ by means of his powerful telescopes, traced the progress of their condensation, not on one only, as their progress does not become sensible until after the lapse of ages, but on the whole of them, as in a vast forest we trace the growth of trees, in the individuals of different ages which it contains. He first observed the nebulous matter diffused in several masses, through various parts of the heavens, of which it occupied a great extent. In some of these masses he observed that this matter was fully condensed about one or more nuclei, a little more brillant. In other nebulæ, these nuclei shine brighter, relatively to the nebulosity which environs them. As the atmosphere of each nucleus separates itself by an ulterior condensation, there results several nebulæ constituted of brilliant nulcei very near to each other, and each surrounded by its respective atmosphere; sometimes the nebulous matter being condensed in a uniform manner, produces the nebulæ which are termed *planetary*. Finally, a greater degree of condensation transforms all these nebulæ into stars. The nebulæ, classed in a philosophic manner, indicate, with a great degree of probability, their future tranformation into stars, and the anterior state of the nebulosity of existing stars. Thus, by tracing the (*Turn to page* 302)

Most Adults Carry Tuberculosis Germs

Public Health

Physician Urges X-Ray of Entire Population

FROM one-half to nine-tenths of the people in this country are carrying in their bodies the germs of tuberculosis, Dr. Linsly R. Williams, president of the National Tuberculosis Association, declared at the annual meeting of the organization which has for over a quarter of a century been fighting the dread white plague.

"We must consider every person as a possible carrier of tuberculosis," Dr. Williams said. If there were but a few thousand carriers the problem might be solved, he explained. But probably one-tenth of that vast portion of the population that carries the germs are what are called "spreaders", meaning that they not only carry the germs but spread them to others.

Dr. Williams outlined the scientific knowledge we now have about the disease, and said that if it could be applied to the population, tuberculosis might be eradicated.

"But we cannot handle and control human beings as we do a test tube or a guinea pig. The human being insists on escaping his cage, even though he be incarcerated for life. In some measure we can isolate those individuals who are a constant menace to society. It is even possible to isolate persons who constitute a definite danger because at the moment they harbor bacteria which are dangerous to others, but when it comes to the chronic carrier of tuberculosis, the case is difficult."

A plea for directing efforts at diagnosis of tuberculosis to an earlier period of life was made, based on the theory that the majority of people in this country have been infected with tuberculosis by the age of 15 and more than 90 per cent. by the age of 21. Dr. Williams urged that the entire population be watched by annual X-ray examinations so that the persons who have definite signs of disease can be put under proper treatment at an earlier age.

Tumors

THE importance of distinguishing between tuberculosis and tumors of the lungs or bronchi was emphasized by Dr. Channing Frothingham of Boston, speaking at the meeting of the National Tuberculosis Association.

"It is often difficult to differentiate these conditions from pulmonary tuberculosis," he said. "It is important to diagnose these conditions accurately if for no other reason than to save the patient from the expense of seeking a cure for the tuberculosis which does not exist."

These tumors, some of which are cancer, are apparently increasing. The non-cancerous ones may sometimes be successfully removed. The X-ray examination is the most important diagnostic procedure, Dr. Frothingham said.

Sugar

THE different sugars of germ cells are probably among the most important chemical substances concerned with the vital processes of the cells, Prof. Treat B. Johnson of Yale University said.

In the Yale laboratories, tuberculosis germs by the pound have been analyzed chemically and found to contain among other things poisonous sugars. The sugars of the bacterial cells exist in very complex forms. The existence of these complex, highly poisonous sugars appears to be characteristic of germ cells in general, and are not necessarily characteristic of the tuberculosis germs alone, Prof. Johnson pointed out.

When considering the question of immunity to diseases, the proteins of the cells have been given chief attention. Prof. Johnson suggested that the sugar of the cell must now be taken into consideration as well.

Science News-Letter, May 10, 1930

A Trip to the Sun in 13 Months

Astronautics

A TRIP to the center of the sun, in a space ship speeding at the rate of 10,000 miles an hour, was described as the fanciful possibility of some remote future explorers by Prof. John Q. Stewart of Princeton University, in a report to the American Philosophical Society. This astronomical flight of fancy prefaced a paper on "The Physics of a Star."

Prof. Stewart said:

"We shall travel in imagination at the arbitrary rate of 10,000 miles per hour. A couple of minutes at this speed carries us up through the last vestiges of the earth's atmosphere; in one day we are crossing the moon's orbit; but it requires 3½ months to reach the orbit of Venus; 4½ months more to reach the orbit of Mercury, and nearly thirteen months in all to arrive at the surface of the sun. During the last fortnight of that period we might be travelling through the sun's corona, and at any time during the last two days we might encounter a prominence. We plunge into the chromosphere and ride down through it for an hour. We dash through the reversing layer in a very few seconds, and a few seconds later are lost to sight beneath the photosphere. Still holding our speed of 10,000 miles an hour, it requires 42 hours longer to reach the center of the sun."

Time-Table of Trip Into Sun, at 10,000 Miles per Hour

To top of atmosphere	3 minutes
To moon's orbit	1 day
To Venus's orbit	3½ months
Venus to Mercury	4½ months
Mercury's orbit to corona	4½ months
Through corona	2 weeks
Through chromosphere	1 hour
Through reversing layer	4 seconds
Through photosphere	4 seconds
On to sun's center	42 hours

"There is one condition with which all passengers must comply—no remarks about the temperature! Our ship is provided with refrigerating machinery, and plenty of power to operate it. To make habitable a space of 10 cubic feet at the sun's surface—barely enough to hold a man—would require a refrigerating plant rated at 60,000 kilowatts. At the sun's center, according to Eddington's temperature of 40,000,000 degrees Centigrade absolute, the power required would be greater by a factor of 4000 trillion. The high cost of living at the center of the sun ought to be notorious. If power cost only 1/1000 cent a kilowatt century—which is all of a billion times cheaper than the usual rate—the refrigerating bill for keeping a man alive at the sun's center would be 50 million dollars a minute."

Science News-Letter, May 10, 1930

Bacteria May Replace Ponderous Presses

Bacteriology—Chemistry

Extract Oil From Coconuts at Much Lower Cost

TINY bacteria may replace ponderous iron presses in the work of extracting vegetable oils from many varieties of seeds and nuts. This is the suggestion of John Woods Beckman, an Oakland industrial chemist, made in a report to the American Chemical Society.

Vegetable oils are held in microscopic cells in plant tissue. The walls of these cells are composed of tough cellulose. The pressing of vegetable material for oils means crushing these cell walls. Exceptionally tough cell walls often offer so much resistance to pressure that extraction of fat is far from complete. A means of eliminating the cell walls not only would liberate the fat more perfectly, but would leave the remaining cellulose material in far better condition for further working. The residue, a hard fibrous cake in the pressing method, is valuable as a source of by-products, chief among which is cattle food.

To dissolve the cell walls by chemicals is inadvisable, because most substances necessary would affect the quality of the oil. These same walls, eaten away by the action of bacteria, would liberate the oil completely and untouched.

"There is a very prevalent hardy and vigorous bacterium that is easy to obtain from brewers' malt," says Mr. Beckman. "This bacterium has been pressed into service in a new oil recovery process.

"The temperature at which these organisms prefer to work is 60 degrees Centigrade, and this fact makes it possible to work under conditions that are self-sterilizing. If a culture of this organism made from brewer's malt is mixed with disintegrated nuts such as copra (dried coconut) together with a weighed amount of ground limestone and sufficient water to form a mush, and the resulting mixture is placed in an incubator at the desired temperature, with exclusion of air, active growth takes place, and free oil begins to appear on the surface. After about six days the oil can be recovered from the residue by filtration."

Several advantages are claimed for this method over the older method of pressing. There is more complete extraction of oil, which means greater profit. The quality of the oil is better. The residue, containing as it does bacteria, amino acids made indirectly by the bacteria, and calcium lactate, is more valuable as cattle feed than the cake produced by pressing. It is virtually a predigested food which can be fed in larger quantities than press cake. The cost of operation is only a fraction of the cost of producing oil by the standard pressing method," writes Mr. Beckman.

Science News-Letter, May 10, 1930

Physicians to Learn New Treatment

Medicine

MOUNT Alto Veterans' Hospital in Washington is to be made a training center for Veterans Bureau hospital physicians learning the Baer method of treating the dangerous bone disease, osteomyelitis, with maggots, tiny larvae of flies.

This is now the plan of the Veterans Bureau, Representative Royal C. Johnson of South Dakota, told the Veterans' Committee of the House of Representatives. Representative Johnson is chairman of the committee, and recently arranged for Dr. William S. Baer, clinical professor of orthopedic surgery at Johns Hopkins University, Baltimore, together with his assistant, Dr. S. K. Livingston, to give a lecture with slides and demonstrations on his treatment before all committee members.

Because doctors must be well trained before they go out to the hospitals and introduce this treatment, Representative Johnson said, it was thought that the best plan was to make Mt. Alto hospital a training center for doctors to learn the work at first hand.

Mt. Alto is staffed largely by Johns Hopkins men, he said.

Appropriately enough the new method, which is to be used to treat the thousands of veterans suffering from this bone disease as soon as their physicians and surgeons can learn its technique, was developed as a result of observations made on wounded men during the World War. Dr. Baer was then chief surgeon of the orthopedic section of the medical corps of the second army of the A. E. F.

Treating the wounded as they came into the hospitals, he noticed that those who had been lying out on the fields for hours were brought in with their wounds covered by the tiny crawling maggots, the larvae from which common flies develop. But these men, strangely enough, did not develop infections in their wounds, as did those whose wounds had been dressed and treated very soon after their infliction.

After the war, Dr. Baer remembered the maggots when he was treating children suffering from osteomyelitis. This disease is an inflammation of the bone, more common in children than in adults. It is the result of an infection and requires prompt surgical treatment. It is also frequent in soldiers following wounds in which the bony tissue has been injured. Recovery is often delayed for years if the disease reaches the chronic stage. Dr. Baer remembered the maggots on the soldiers whose wounds healed quickly, and he remembered that the healers of ancient times had written that maggots should be used to clean up wounds of patients whose bones had been broken. He then started careful, scientific investigations.

The action of the maggots, Dr. Baer found, is to eat the dead tissues, bone and flesh, of the wounds and thus to destroy the material that would have furnished good breeding ground for bacteria. The bacteria which might have entered a wound and set up an infection were unable to exist in the wound scavenged by the maggots. Dr. Baer has had excellent results with this method in treating children.

The investigations had a number of setbacks. During the first winter, the supply of maggots gave out abruptly when cold weather killed the flies, and more had to be brought hurriedly from warmer cities than Baltimore. Then Dr. Baer started breeding maggots, so as to have a constant supply available.

Science News-Letter, May 10, 1930

NATURE RAMBLINGS

By Frank Thone

Swift Wings

ONE of the favorite sentimental songs of our mothers—and of the younger generation among our grandmothers—was "When the Swallows Homeward Fly." As music that song was mighty good (ask Dad; he knows), but as ornithology it can have no standing at all.

For it envisaged, sadly, as all the good old songs liked to do, these swift-winged birds flying away to some unknown home in the South, leaving the northern skies as desolate and empty as a disappointed lover's heart. But as a matter of fact when the swallows fly southward in autumn they are going away from home. Their home is here, among our own chimneys and cliffs, and when the swallows homeward fly they are coming back to us. And that is what they are doing now.

The swallow, with his cousin the swift, does not come north quite so promptly and in defiance of chances of late snowstorms as do the robins and redwinged blackbirds. He is an early comer, but a safe one, and when you see him circling in the air it is safe to call spring an established fact.

Swallows and swifts are not identical, though they are usually lumped into one by the average citizen. They look a good deal alike, and their habits in flight are very similar, so that only the most meticulous of scientists would find fault with this popular confusion in nomenclature. As a matter of fact, one of the most notable of early American ornithologists called the chimney swift a swallow.

Both swallows and swifts are "wing feeders," catching their insect prey on the fly. That explains their swoopings and circlings and occasional eccentric dartings. They do fly for fun a part of the time, but a great part of their energetic wing work is involved in the serious business of getting a living.

King Sargon—*Cont'd*

heads and will make one of the most beautiful examples of Assyrian art. And the Assyrians, in my opinion, have surpassed even the Greeks in their representations of animals. This cannot be said of the human figures, because there they followed too closely their own artistic conventions.

The "quarry" was carefully excavated, and we were able to save for science several important slabs. One of these represents two small horses and three attendants, all perfectly preserved. We excavated in a large, well-paved courtyard, and there we had the prize find: six large slabs of stone, two and one-half by three and one-half meters (about eight by eleven and a half feet), each one representing two immense figures of eunuchs bearing gifts to King Sargon. Four of these six slabs, and the most interesting ones at that, had never been seen by anyone since Assyrian days. A number of small objects also were salvaged, among which the most notable are a group of clay labels that had been used in closing cloth bags. Against the clay seals could still be seen the impression of the cloth, and imbedded in the clay was still the cord which had been used in tying them. Most of these labels were impressed with Assyrian seals; but one of them had an inscription in early Aramaic, and another in the still unreadable Hittite characters.

The published plans of the palace were improved upon, at least for the portion of it that could be excavated during the first campaign. Last, perhaps, in scientific interest, but first for its popular appeal, was the discovery and transportation of a huge Assyrian bull, weighing about thirty-five tons. He is one of those hybrid figures, with the head and beard of a man, the wings of an eagle, and the body of a bull, that used to watch the gates of the palace to ward off evil spirits. He lies now, well protected in strong cases, under the north stand of the football field at the University of Chicago. When the new building of the Oriental Institute shall have been completed, he will resume his duties, interrupted for twenty-seven centuries. Though six thousand miles from his original location and among strange people, he will have at least one consolation: the new building will never be permitted to fall over his head, for scientific interest will outlive the whole Assyrian Empire.

World System—*Cont'd*

progress of condensation of the nebulous matter, we descend to the consideration of the Sun, formerly surrounded by an immense atmosphere, to which consideration we can also arrive, from an examination of the phenomena of the solar system, as we shall see in our last note. Such a marked coincidence, arrived at by such different means, renders the existence of this anterior state of the Sun extremely probable.

Connecting the formation of comets with that of nebulæ, they may be considered as small nebulæ, wandering from one solar system to another, and formed by the condensation of the nebulous matter which is so profusely distributed throughout the universe. The comets will be thus, relatively to our system, what the meteoric stones appear to be relatively to the earth, to which they do not appear to have originally belonged. When these stars first become visible, they present an appearance perfectly similar to the nebulæ; so much so, that they are frequently mistaken for them, and it is only by their motion, or by our knowing all the nebulæ contained in our part of the heavens, that we are able to distinguish one from the other. This hypothesis explains, in a satisfactory manner, the increase of the heads and tails of the comets, according as they approach the sun, and the extreme rarity of their tails; motions of the comets, which are performed in every direction, and the great eccentricity of their orbits.

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Chemical Action In Brain Studied

Physiology-Psychiatry

Blood Analysis Shows Sugar and Oxygen are Utilized

A NEW technical procedure by which the chemistry of the brain can be studied directly for the first time was described at the meeting of the American Psychiatric Association by Dr. Abraham Myerson of Boston.

Blood is taken from the artery which leads to the brain, the carotid artery, and from the vein which drains the brain, the internal jugular vein. In this way it is possible to measure directly the chemical changes which take place in the brain itself. The chemical content of the blood thus measured is compared with that of blood taken similarly from an artery and a vein in the arm.

It is thus shown that more sugar disappears in the brain than disappears in the arm. Since sugar is utilized in the body for something corresponding to muscular activity, it is evident that the brain utilizes sugar in somewhat the same manner as does the muscle.

It is also shown by these studies that the brain uses oxygen in at least the same amount as does the arm.

It has been believed that the brain is an active organ using up sugar and oxygen in much the same way that other organs do. It has been impossible to prove this, however, or to measure this activity until the introduction of this new research method.

Excessive Mothering

WHY some women "mother" their children too much has been probed by the Institute of Child Guidance, Dr. David M. Levy of New York reported. Two kinds of over-protective mothers were found.

One kind of over-anxious mother dominates her children, and their personalities become submissive, in boys even effeminate. The other kind indulges her children so much that they become aggressive and self-centered, it was found.

Looking into the life experiences of the mothers to see why they focussed all their attention on their children, the psychiatrist discovered that some of these women suffered from lack of parental love when they were children. Other mothers became over-protective because they were forced to become earners for the family early in life, and they got the habit of directing affairs. Thwarted careers cause some to bend all their talents and energies toward bringing up their children.

Incompatability between husband and wife was found in many of the homes lurking in the background as one cause of the wife's directing all her interests in one channel. Fathers in the "over-mothered" homes played a minor role. They were not consulted about the children, and they submitted to their wives who were supposed to know best.

The children of such homes not only suffered from over-mothering, but also from lack of a father's influence and from lack of the influence of friends and companions, it was shown.

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Cannon-Ball Tree

Botany

The strange growth represented on the cover of this issue of the SCIENCE NEWS-LETTER is not a freak grapefruit tree. It is the normal method of flowering and fruiting of the cannon-ball tree, a member of the monkey-pot family found in the forests of South America. Its fruiting branches always grow out of the lower part of the tree —a scheme that might well have been adopted by other trees that burden themselves with heavy fruits. The big round balls, looking very much like ammunition for old-fashioned smooth-bore ordnance, are filled with inedible, fibrous pulp in which the seeds are embedded. The specimen shown in our picture is on exhibition at the Field Museum of Natural History, Chicago. It was collected by the Stanley Field Guiana Expedition.

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The original tubes with which Roentgen discovered X-rays are preserved in the German Museum at Munich.

An iceless refrigerator designed for country districts that have no gas or electricity burns kerosene to cool its contents.

Weevils and Weather Predict Cotton

Meteorology—Entomology

FICKLE weather and the boll weevil have been made to tell as early as the first of September almost exactly how much cotton will be harvested in United States during the following fall months.

Just how these predictions can be made based on the weather reports from hundreds of stations throughout the cotton belt was made public for the first time by J. B. Kincer, chief of the Division of Agricultural Meteorology of the U. S. Weather Bureau, at the meeting of the American Meteorological Society.

The method which Mr. Kincer and his associates, W. A. Mattice and Miss G. B. Diehl, have worked out during the past two years will give cotton growers, buyers and investors accurate information on production far in advance of the harvest and should enable them to sell and buy more profitably. Calculations have been made of estimated and actual production since 1909 with an accuracy of approximately 97 per cent.

For the bumper crop year of 1926 the actual production was almost exactly the same as they predicted. In 1921, the year of smallest yield, an error of seven per cent. the largest of the 20-year period, was made. For 1928 the prediction was only three per cent. less than the actual production.

To make the calculations, Mr. Kincer used weather information such as amount of rainfall, number of rainy days, relative humidity, amount of sunshine, and average, highest and lowest temperatures. Weevil damage is estimated from the weather of the preceding summer, which determines the number of insects that hibernate during the winter; from the severity of the winter, because many might be killed by the cold; and from growing season weather, as dry weather keeps the weevil in check and damp weather greatly increases his family.

From this information a weevil index is worked out by mathematical relations to be combined with the weather yield relation for the final result. The predictions can be made for each state as well as for the entire cotton belt.

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FIRST GLANCES AT NEW BOOKS

JUNGLE PORTRAITS—Delia Akeley—*Macmillan,* 251 pp., $3.50. Mrs. Akeley is an excellent story teller. With swift and easy style she carries the reader into her adventures with animals and with interesting people among the native tribes. Just as the natives she describes are personalities, not merely types, so the baboons and flamingoes and other creatures of the jungle are real individuals, with temperaments very decidedly pronounced. Mrs. Akeley has made four expeditions to Africa, one trip with no white companions at all, and she is now in that country again living among the pygmies.

Exploration—Travel
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ENGLISH HISTORY—George H. Locke—*Amer. Library Assn.,* 55 pp., 35c. A brief introduction and a guide to a few of the best books on English history. A new pamphlet in the "Reading with a Purpose" series.

History
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STEAM TABLES AND MOLLIER DIAGRAM—Joseph H. Keenan—*American Society Mechanical Engineers,* 63 pp. America's most advanced knowledge of what steam will do at temperatures and pressures even higher than those used in the newest super-power plants is presented. Steam at 1000° Fahrenheit and 3000 pounds pressure, as described in the tables, is not the simple understandable substance it was when just 400° hot and compressed to only 200 pounds, the applied limit for years. But recently man has dared to heat it hotter, compress it closer and make it do more work for him. The tables are the first in the United States to give engineers complete information of the range of temperature and pressure now in use, based on experimental data rather than calculated values. It is expected that more correct tables will be derived from further experiments and international cooperation.

Engineering
Science News-Letter, May 10, 1930

HOLIDAY MEADOW—Edith M. Patch—*Macmillan,* 165 pp., $2. It is a book for children, or rather for a grown-up to read to children; but it does not fall into the all-too-common mortal sin of using baby-talk either in language or in ideas. This makes it a most refreshing book.

Nature Study
Science News-Letter, May 10, 1930

BECAUSE I STUTTER—Wendell Johnson—*Appleton,* 127 pp., $1.50. Even when he isn't saying anything, the stutterer is reacting to life as a stutterer. This unusual little human document explains how this may be, and, what is more to the point, how one man has met the psychological problem of being a stutterer in a world of glib-tongued associates. By focussing his talents and intelligence, this stutterer prevented his speech defect from warping and dwarfing his personality. The author, besides being a stutterer, has had training in psychology and has taken part in numerous investigations of speech at the State University of Iowa.

Psychology
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WINGS, THE A B C OF FLYING—W. Lockwood Marsh—*Vanguard,* 138 pp., 75c. Most of the books on aviation that have appeared in the last year are devoted entirely to airplanes, but this volume of English origin utilizes half its pages describing airships.

Aviation
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THE AMERICAN YEAR BOOK, 1929—*American Year Book Corporation,* 884 pp., $7.50. No other annual compilation so promptly, exhaustively, and authoritatively presents a picture of contemporaneous American progress as the American Year Book. This year's issue has the sponsorship of 46 national learned societies, and the contributions from 196 authorities. It will be particularly useful on the general reference shelf because it combines within one cover summaries of science and technology with those in government, literature, religion and other fields of human endeavor.

Reference
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STEAM GENERATION STEPS AHEAD—G. B. Gould—*Fuel Engineering Company,* 101 pp., $1. Not all the power the world uses is produced in mammoth plants. There is a considerable group of industrial steam plants between five hundred and five thousand horse-power whose efficiency must keep as close pace with the big plants as is economically desirable. This little book will help the industrial executive get the most power for the least money.

Engineering
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SITKA—Barrett Willoughby—*Houghton Mifflin,* 233 pp., $3. Alaska of the days when Russian governors ruled is here backgrounded by modern young Alaska of today. Miss Willoughby views the past through the stories of the descendants of those who lived in those days when Alaskans drank to the Czar. Her book combines historical romance with travel information.

Geography
Science News-Letter, May 10, 1930

A HISTORY OF MODERN TIMES—D. M. Ketelbey—*Crowell,* 623 pp., $3.75. A six-hundred page narration of the rise of democracy in the world. The story begins in 1789 with the beginning of the French revolution and the United States of America. It is entertainingly and dramatically told.

History
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GAUGES AND FINE MEASUREMENTS—F. R. Rolt—*Macmillan,* 2 volumes: 366 + 357 pp., $14.50. Mass production, so important in this industrial civilization, rests upon the basis of accurate measurements. The introduction to this monumental two-volume work explains that measurements of millionths of an inch are not "a mere academic *tour de force* of the standardizing laboratory, but a practical necessity which the laboratory has had to provide in order to meet the requirements of industry." In fact, three separate methods are now available by which measurements of this accuracy can be made and gages of the necessary projections are obtainable from several sources. When the British firm of Johansson in 1908 introduced their now well-known block and slip-gauge system they produced one of the essential elements upon which modern manufacturing, dominated by the machine and its interchangeable products, is traced. The author is on the staff of the National Physical Laboratory at Teddington. The first volume covers standards of length-measuring machines, and comparators; the second volume deals with limit-gauges, measuring instruments and general methods of measurement, while a third volume still to be published will discuss screw-gauge measurements.

Physics
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Punch Here to Fit SCIENCE NEWS-LETTER Binder Cover